217/782-2113

CONSTRUCTION PERMIT - NESHAP SOURCE – NSPS SOURCE

PERMITTEE

North Shore Sanitary District
Attn: Brian Jensen
Wm. Koepsel Drive
Gurnee, Illinois 60031

Application No.: 03100020 I.D. No.: 097200ABD
Applicant's Designation: 030618MELT Date Received: October 20, 2003
Subject: Sludge Processing Facility
Date Issued: TO BE DETERMINED
Location: 9th Street and Green Bay Road, Zion

Permit is hereby granted to the above-designated Permittee to CONSTRUCT emission source(s) and/or air pollution control equipment consisting of a sludge processing facility, including a sludge receiving and storage area (bins, silos) controlled by two stage packed tower scrubbers, drying process (sludge dryer, double cyclone, condensers, dry granulate silo, truck loadout) controlled by two stage packed tower scrubbers, melting process controlled by a filter, scrubber/condenser, particulate filter and fixed bed activated carbon filter, auxiliary heater equipped with low-NO_x burner technology, and associated equipment, as described in the above-referenced application. This Permit is subject to standard conditions attached hereto and the following special condition(s):

1.0 Unit Specific Conditions

1.1 Unit: Sludge Processing Facility

1.1.1 Description

Handling Process

Wet sludge from the North Shore Sanitary District's Waukegan, Clavey Road, and Gurnee sewage treatment plants will be delivered by truck and dumped into one of two receiving pits within an enclosed building. The wet sludge will be conveyed from the pits to one of two wet sludge silos for storage until processing. Both the sludge receiving room and the wet sludge silo vents will be routed to the facility's odor control system (two stage packed tower scrubbers).

Drying Process

The sludge dryer is designed to yield a dried granulate of approximately 5% moisture. The dryer is heated indirectly, via a hot oil heat recovery loop from the melter. The dryer exhaust will be routed through a condenser and vented into the dry granulate silo. Dry granulate will be conveyed from the dryer, through a

cooler, to a silo. The dry granulate silo will be vented to the odor control scrubbers.

Melter Process

Dry granulate is taken from the dry granulate silo, through a surge hopper, and introduced into the melter. Oxygen is supplied from an electrically driven air separation unit to support combustion. The approach of using oxygen versus air to support combustion reduces nitrogen oxides (NO_x) emissions because the nitrogen (otherwise in air) is not present. In the melter, the combustible fraction of the dry granulate burns, while the mineral portion forms molten glass. The glass flows through a drain port where it drops into a quench tank, forming a glass aggregate product. The melter exhaust gas passes through a heat exchanger where recovered energy heats the oil transfer fluid that is used to heat the sludge dryer. After the heat recovery unit, the exhaust passes through an initial filter and scrubber. The exhaust flow is then split with most of the flow recirculated to the melter. The remainder of the gas flow passes through a final particulate filter/fixed bed activated carbon filter (mercury adsorption system) and then vented to atmosphere. Spent carbon from the activated carbon filter will be sent for recycling or land disposal.

Auxiliary Heater

A 20 million Btu/hr natural gas-fired auxiliary heater will be used for unit start-up and back-up if the melter is not in operation. The heater will be equipped with a low-NO_x burner.

1.1.2 List of Emission Units and Air Pollution Control Equipment

Emission Unit	Description	Emission Control Equipment
Handling Process	Sludge Receiving and Storage Area (Bins, Silos)	Two Stage Packed Tower Scrubbers
Drying Process	Sludge Dryer, Double Cyclone, Condensers, Dry Granulate Silo, Truck Loadout	Two Stage Packed Tower Scrubbers
Melting Process	Melter	Filters and Scrubber/ Condenser, Fixed Bed Activated Carbon Filter
Auxiliary Heater	Auxiliary Heater	Low-NO_x Burner

1.1.3 Applicability Provisions and Applicable Regulations

a. The auxiliary heater, which has a maximum design heat input capacity between 10 million Btu/hr and 100 million Btu/hr, is subject to the NSPS for Small Industrial-Commercial Institutional Steam Generating Units, 40 CFR 60 Subparts A and Dc. The Illinois EPA administers the NSPS for subject sources in Illinois pursuant to a delegation agreement with the USEPA. Because the auxiliary heater only burns natural gas it is not subject to emission standards pursuant to the NSPS

b. i. The melter is subject to the NESHAP for Mercury, 40 CFR 61 Subparts A and E. The Permittee must comply with all applicable requirements of this NESHAP.

Note: The mercury emissions of the melter are limited by this permit to a level well below that allowed by the NESHAP, (refer to Condition 1.1.6(a)), and

ii. The melter shall comply with the requirements in the National Emission Standards for Beryllium, 40 CFR Part 61, Subpart C, pursuant to 40 CFR 503.43, under the Clean Water Act.

c. The melter is subject to the NSPS for Sewage Treatment Plants, 40 CFR 60, Subparts A and O, which provides that the Permittee shall not discharge or cause the discharge into the atmosphere of:

i. Particulate matter at a rate in excess of 0.65 gram/kilogram dry sludge input (1.30 pound/ton dry sludge input) [40 CFR 60.152(a)(1)].

ii. Any gases which exhibit 20 percent opacity or greater [40 CFR 60.152(a)(2)].

d. The melter is subject to 35 IAC 212.181(b): Limitations for Incinerators, which provides that no person shall cause or allow the emission of particulate matter into the atmosphere from any incinerator burning more than 0.907 megagrams/hour (2,000 pounds/hour) but less than 27.2 megagrams/hour (60,000 pounds/hour) of refuse to exceed 183 milligrams per standard cubic meter (0.08 grains per standard cubic foot) of effluent gases corrected to 12 percent carbon dioxide.

e. The melter is subject to 35 IAC 216.141: Incinerators, which provides that no person shall cause or allow the emission of carbon monoxide into the atmosphere from any incinerator to exceed 500 parts per million, corrected to 50 percent excess air.

f. The various emission units in the sludge processing facility are subject to 35 IAC 212, Subpart B: Visible Emissions, which provides that:

> No person shall cause or allow the emission of smoke or other particulate matter, with an opacity greater than 30 percent, into the atmosphere from any emission unit other than those emission units subject to 35 IAC 212.122 [35 IAC 212.123(a)].
>
> Note: This permit does not provide for the exception from this emission standard contained in 35 IAC 212.123(b) because this exception cannot be readily applied to this facility.

g. i. This permit does not address treatment of wastewater at the facility. If the Permittee proposes to conduct operations at the facility, other than pre-treatment activities such as neutralization prior to discharge to the sewer, the Permittee shall obtain a separate construction permit for these activities.

ii. This permit is issued based on negligible emissions of VOM from handling of wastewater. For this purpose, VOM emissions shall not exceed 0.1 tons/month and 1.2 tons/year.

1.1.4 Non-Applicability of Regulations of Concern

a. This permit is issued based on the melting process not being subject to the New Source Performance Standards (NSPS) for Glass Manufacturing Plants, 40 CFR Part 60, Subpart CC, because the NSPS for glass-manufacturing plants was developed to address conventional glass manufacturing plants that make products like flat window glass and glass bottles or other types of containers. Furthermore, there are not any emission standards under this NSPS that would apply to a facility of this type.

b. This permit is issued based on the sludge dryer not being subject to the National Emission Standards for

Hazardous Air Pollutants (NESHAP) for Mercury, 40 CFR Part 61, Subpart E, because the sludge dryer is heated indirectly.

1.1.5 Operational Limits and Control Requirements

a. i. The sludge dryer shall be heated indirectly, via a hot oil heat recovery loop from the melter or auxiliary heater. Accordingly, no combustion emissions will be associated from the dryer.

ii. The melter shall utilize an oxygen-rich combustion process via an air separation unit. The melting process shall be operated and maintained to ensure proper oxygen supply to the melter.

iii. The auxiliary heater shall be equipped, operated, and maintained with a low NO_x burner designed to emit no more than 0.1 lb NO_x/million Btu. The burner shall be operated and maintained in conformance with good air pollution control practices.

b. i. Production rate of the drying process shall not exceed 20,000 pounds wet sludge per hour (daily average).

ii. Production rate of the melting process shall not exceed 3,160 pounds dry sludge per hour (daily average).

iii. The maximum firing rate of the auxiliary heater shall not exceed 20 mmBtu/hr.

c. The average daily concentration of lead and arsenic, cadmium, chromium and nickel in the sewage sludge fed to the melter shall not exceed pollutant limits for the sludge established using the methodology of 40 CFR 503.43(c) and (d).

d. The melting process shall be operated to comply with the applicable operational standards for total hydrocarbons as specified in 40 CFR 503.44.

e. During the operation of associated emission units, the operating parameters of air pollution control equipment shall be maintained in a range that is consistent with the levels monitored during emission testing.

1.1.6 Emission Limitations

a. i. Emissions of volatile organic material (VOM), particulate matter (PM), nitrogen oxides (NO_x), carbon monoxide (CO), and sulfur dioxide (SO_2) from the melting process shall not exceed the following limits:

Pollutant	Emissions (Lb/Hr)	(Ton/Yr)
VOM	0.28	1.25
PM	0.51	2.25
NO_x	19.54	85.61
CO	0.49	2.15
SO_2	7.58	33.22

ii. Emissions of mercury from the melting process shall not exceed 0.0066 lb/ton dried sludge and 1.77 pounds/year.

b. Emissions from the auxiliary heater shall not exceed the following limits:

Pollutant	Emissions (Lb/Hr)	(Ton/Yr)
VOM	0.11	0.48
PM	0.15	0.67
NO_x	2.00	8.76
CO	1.68	7.36
SO_2	0.01	0.05

c. Emissions from the sludge receiving and storage area (bins, silos) and the drying process (sludge dryer, double cyclone, condensers, dry granulate silo, truck loadout) all controlled by two stage packed tower scrubbers shall not exceed the following limits:

Pollutant	Emissions (Lb/Hr)	(Ton/Yr)
VOM	1.65	7.22
PM	0.30	1.30
NO_x	0.16	0.72
CO	0.40	1.73

d. Compliance with the annual limits in this permit shall be determined from a running total of 12 months of data.

e. The emission limitations of this permit would limit the potential emissions of air pollutants from the

facility to less than major source thresholds (i.e., nitrogen oxides to less than 100 tons per year, individual hazardous air pollutants to less than 10 tons per year, and a combination of hazardous air pollutants to less than 25 tons per year). As a result, it is expected that the facility will be excluded from the requirements to obtain a Clean Air Act Permit Program (CAAPP) permit.

1.1.7 Testing Requirements

a. Emissions Testing

i. A. Within 90 days of initial startup, the emissions shall be measured by an approved testing service at the Permittee's expense while operating at a maximum throughput and other representative operating conditions, as identified in Attachment 1:

B. Three additional mercury tests shall be completed over the operating lifecycle of the activated carbon filters at times or conditions as specified by the Illinois EPA to verify that the mercury emission limitation in Condition 1.1.6(a) is met. If the tests demonstrate compliance, the testing frequency shall be once every three years.

C. Additional emission testing shall be conducted upon a reasonable request by the Illinois EPA.

ii. The following methods and procedures shall be used for testing of particulate matter, nitrogen oxides, metals and mercury emissions, unless another USEPA Method is approved by the Illinois EPA: Refer to 40 CFR 60, Appendix A, and 40 CFR 61, Appendix B, for USEPA test methods. Testing for particulate matter emissions shall also comply with the requirements of 40 CFR 60.154.

Location of Sample Points:	USEPA Method 1
Gas Flow and Velocity:	USEPA Method 2
Flue Gas Weight:	USEPA Method 3
Moisture:	USEPA Method 4
Particulate Matter	USEPA Method 5/202
Nitrogen Oxides	USEPA Method 7
Mercury	USEPA Method 101A
Metals	USEPA Method 29

b. Sludge Sampling

i. The Permittee shall comply with the sludge sampling requirements of the NESHAP for mercury emissions (40 CFR 61.54).

ii. The Permittee shall comply with the applicable sludge monitoring requirements specified in 40 CFR 503.46(a).

c. Air Dispersion Modeling and Emission Testing

The Permittee shall comply with the requirements for air dispersion modeling and emission testing specified in 40 CFR 503.43(e), as necessary to establish pollutant limits for the sludge for purposes of Condition 1.1.5(e).

1.1.8 Monitoring Requirements

a. The Permittee shall maintain an operating and maintenance log for each air pollution control system in the sludge processing facility.

b. i. The Permittee shall monitor the following information for the packed tower odor scrubber system (C-01):

A. Scrubbant flow rate (gallons/minute); and

B. Gas flow rate through the control system (acfm).

ii. The Permittee shall measure and record the operating temperature and pressure drop of the melter final filter system on at least a daily basis.

iii. The Permittee shall monitor the following information for the melter scrubber system (C-04):

A. Scrubbant flow rate (gallons/minute); and

B. Pressure drop across the scrubber.

c. Unless the Permittee notifies the Illinois EPA that it will be conducting monitoring for total hydrocarbons in accordance with Condition 1.1.8(d), below, emissions monitoring for carbon monoxide shall be conducted on the melter exhaust as follows, provided however that this emissions monitoring may

be waived by the Illinois EPA if the demonstrated performance of the melter as monitored for no less than two years shows consistent compliance with Condition 1.1.8(c)(ii):

i. The exit gas from the melter stack shall be monitored continuously for carbon monoxide, oxygen content and moisture.

ii. The monthly average concentration of carbon monoxide in the exit gas from the melter stack, corrected for zero percent moisture and to seven percent oxygen, shall not exceed 100 parts per million on a volumetric basis.

iii. The Permittee shall retain the following information for five years:

A. The carbon monoxide concentrations in the exit gas; and

B. A calibration and maintenance log for the instrument used to measure the carbon monoxide concentration.

iv. The Permittee shall promptly report to the Illinois EPA following the end of each calendar year the monthly average carbon monoxide concentrations in the exit gas.

d. The Permittee has the option of complying with Condition 1.1.8(d), rather than Condition 1.1.8(c) as provided in 40 CFR 503.40(c):

i. The Permittee shall install, calibrate, operate, and maintain an instrument that continuously measures and records the total hydrocarbons concentration in the melter exit gas [40 CFR 503.45(a)(1)].

ii. The total hydrocarbons instrument shall employ a flame ionization detector; shall have a heated sampling line maintained at a temperature of 150 degrees Celsius or higher at all times; and shall be calibrated at least once every 24-hour operating period using propane.

iii. The total hydrocarbons concentration and oxygen concentration in the exit gas from the melter stack, the information used to measure moisture content in the exit gas, and the

combustion temperatures for the melter shall be monitored continuously.

iv. The Permittee shall maintain records of the following:

A. The total hydrocarbons concentrations in the exit gas from the melter stack.

B. A calibration and maintenance log for the instruments used to measure the total hydrocarbons concentration and oxygen concentration in the exit gas from the melter stack, the information needed to determine moisture content in the exit gas, and the combustion temperatures.

e. For the melter, the Permittee shall comply with the monitoring of operations requirements specified by 40 CFR 60.153, which require that the Permittee shall:

i. A. Install, calibrate, maintain, and operate a flow measuring device which can be used to determine either the mass or volume of sludge charged to the incinerator. The flow measuring device shall be certified by the manufacturer to have an accuracy of ±5 percent over its operating range. The flow measuring device shall be operated continuously and data recorded during all periods of operation of the incinerator 40 CFR 60.153(a)(1)].

B. Provide access to the sludge charged so that a well-mixed representative grab sample of the sludge can be obtained [40 CFR 60.153(a)(2)].

ii. The Permittee shall submit to the USEPA for approval a plan for monitoring and recording incinerator and control device operation parameters. The plan shall be submitted to the USEPA no later than 90 days after the notification of commencement of construction [40 CFR 60.153(e)(2)].

1.1.9 Recordkeeping Requirements

a. The Permittee shall keep documentation indicating the maximum firing rate of the auxiliary heater.

b. The Permittee shall maintain the following operational records:

i. Type of scrubbant used in the scrubber systems;

ii. Production rate for the drying process (lb wet sludge/hr, daily average);

iii. Production rate for the melting process (lb dry sludge/hr, daily average);

iv. The operating combustion temperatures for the melter;

v. Amount of fuel combusted by the auxiliary heater during each day [40 CFR 60.48c(g)].

c. i. The Permittee shall keep inspection and maintenance logs for each air pollution control system, which identify each activity performed.

ii. For the activated carbon filter, the Permittee shall keep the following records:

A. The manufacturer's specifications for the filter.

B. The manufacturer's recommended operating procedures.

C. The theoretical mercury absorption capacity of the filter.

D. Each time the remaining capacity of the filter is analyzed.

E. Each time when the filter is replaced.

d. i. The Permittee shall maintain records of the NO_x, CO, VOM, SO_2, PM, and mercury emissions (tons/month and tons/year) based on appropriate emission factors and control performance demonstrated by emission testing in accordance with Condition 1.1.7, monitoring data collected pursuant to Condition 1.1.8, and other operating records, with supporting calculations.

ii. For each deviation from normal operating conditions, the Permittee shall prepare an engineering estimate of the excess emissions associated with the incident.

e. The Permittee shall comply with the applicable recordkeeping requirements specified in 40 CFR 503.47.

1.1.10 Notification Requirements

a. The Permittee shall notify the Illinois EPA within 30 days of noncompliance of the sludge processing facility with the permit requirements as follows. Notifications shall describe the probable cause of such deviations, and any corrective actions or preventive measures taken.

b. Notification of Startup: The Permittee shall furnish the Illinois EPA with written notification as follows:

i. A notification of the anticipated date of initial startup of the melting process not more than 60 days nor less than 30 days before that date.

ii. A notification of the actual date of initial startup of the melting process within 15 days after that date.

c. Notification of Testing

i. At least 60 days prior to the actual date of testing, a written test plan shall be submitted to the Illinois EPA for review. This plan shall describe the specific procedures for testing, including as a minimum:

A. The person(s) who will be performing sampling and analysis and their experience with similar tests.

B. The specific conditions under which testing will be performed, including a discussion of why these conditions will be representative of maximum throughput and maximum emissions and the means by which the operating parameters for the emission unit and any control equipment will be determined.

C. The specific determinations of emissions and operation that are intended to be made, including sampling and monitoring locations.

D. The test method(s) that will be used, with the specific analysis method, if the method can be used with different analysis methods.

E. Any minor changes in standard methodology proposed to accommodate the specific circumstances of testing, with justification.

F. The format and content of the Source Test Report.

ii. The Illinois EPA shall be notified prior to these tests to enable the Illinois EPA to observe these tests. Notification of the expected date of testing shall be submitted a minimum of thirty days prior to the expected date. Notification of the actual date and expected time of testing shall be submitted a minimum of five working days prior to the actual date of the test. The Illinois EPA may at its discretion accept notifications with shorter advance notice provided that the Illinois EPA will not accept such notifications if it interferes with the Illinois EPA's ability to observe testing.

d. i. For the auxiliary heater, the Permittee shall comply with the applicable reporting requirements of 40 CFR 60.48c which includes but is not limited to notification of the date of construction.

ii. For the melter, the Permittee shall comply with the applicable notification requirements of 40 CFR 60.7 which includes but is not limited to notification of the date of construction.

1.1.11 Reporting Requirements

a. The Permittee shall submit the Final Reports for emission testing required by Condition 1.1.7 within 45 days after the test results are compiled and finalized. The Final Report shall include as a minimum:

i. A summary of results

ii. General information

iii. Description of test method(s), including description of sampling points, sampling train, analysis equipment, and test schedule

iv. Detailed description of test conditions, including

A. Process information, i.e., mode(s) of operation, process rate, e.g. fuel or raw material consumption

B. Control equipment information, i.e., equipment condition and operating parameters during testing, and

C. A discussion of any preparatory actions taken, i.e., inspections, maintenance and repair

v. Data and calculations, including copies of all raw data sheets and records of laboratory analyses, sample calculations, and data on equipment calibration

b. The Permittee shall submit semi-annual compliance reports that include:

i. Amount of wet sludge processed.

ii. A summary of deviation, if any.

iii. Emissions on a monthly basis.

c. For the melter, the Permittee shall comply with the reporting requirements specified by 40 CFR 60.155(c), which requires that the semi-annual report include records of control device operation measurements, as specified in the plan approved under 40 CFR 60.153(e).

d. The Permittee shall promptly submit to the Illinois EPA following the end of each calendar year the information specified in 40 CFR 503.47(b) through 40 CFR 503.47(h).

e. Two copies of reports and notifications required by this permit concerning equipment operation or repairs, performance testing or a continuous monitoring system shall be sent to:

Illinois Environmental Protection Agency
Division of Air Pollution Control

Compliance Section (#40)
P.O. Box 19276
Springfield, Illinois 62794-9276

and one copy shall be sent to the Illinois EPA's regional office at the following address unless otherwise indicated:

Illinois Environmental Protection Agency
Division of Air Pollution Control
9511 West Harrison
Des Plaines, Illinois 60016

1.1.12 Compliance Procedures

Compliance with the emission limits established in Condition 1.1.6 shall be based on the recordkeeping requirements in Condition 1.1.9 and emission factor based calculations. For particulate and mercury calculations, appropriate site-specific emission factors derived from the most recent stack tests required by Condition 1.1.7 shall be used.

2a. This permit for the above referenced project does not relieve the Permittee from responsibility to comply with all Local, State and Federal Regulations which are a part of the applicable Illinois State Implementation Plan, as well as all other applicable Federal, State and Local requirements.

b. In particular, this permit does not relieve the Permittee from the responsibility to carry out practices during the construction and operation of the plant, such as application of water or dust suppressant to unpaved traffic areas, to minimize fugitive dust and prevent an air pollution nuisance from fugitive dust, as prohibited by 35 IAC 201.141.

3a. The 100 kW natural gas-fired emergency generator is exempt from state permit requirements, pursuant to 35 IAC 201.146(i).

b. This permit is issued based on negligible emissions from the generator. For this purpose, the generator shall not operate more than 500 hours per year and emit more than 0.3 tons/year of NO_x and more than 0.1 tons/year each of VOM, PM/PM_{10}, SO_2, and CO.

4. Operation of the sludge processing facility is allowed under this construction permit for a period of 365 days, during which period shakedown of equipment and emissions testing shall be performed. This period shall begin when sludge is first dried by the facility. This condition supersedes Standard Condition 6b.

If you have any questions on this, please call Jason Schnepp at 217/782-2113.

Donald E. Sutton, P.E.
Manager, Permit Section
Division of Air Pollution Control

DES:JMS:

cc: Region 1

Attachment 1

Emission Testing Table

Unit	Pollutant						
	VOM	PM	NO_x	CO	Mercury	Other Metals	Opacity
Dryer (Odor Control Scrubber)	X	X					X
Melter (Final Filter)	X	X	X	X	X	X	X
Auxiliary Heater			X				

X = testing of particular pollutant is required

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